

1 **MULTI-COLOR BOTTLE BLANK OR CONTAINER AND THE**
2 **METHOD FOR MAKING IT**

3 **BACKGROUND OF THE INVENTION**

4 **1. Field of the Invention**

5 The present invention relates to a multi-color bottle blank or a
6 multi-color container, wherein the first bottle blank portion is integrally
7 combined with the second bottle blank portion exactly and completely to
8 form a multi-color bottle blank having a rigid and stable structure.

9 **2. Description of the Related Art**

10 A conventional plastic container is made by a bottle blank. The
11 bottle blank is initially baked and heated. Then, the bottle blank is placed
12 into a die to perform a blowing expansion process, thereby expanding the
13 volume of the bottle blank to form the plastic container having a larger
14 volume. The bottle blank is made by injecting a melted plastic material into
15 a mold cavity of a die. Then, the melted plastic material is cooled rapidly,
16 so that the temperature is smaller than the crystalline temperature of the
17 plastic material, thereby forming the bottle blank.

18 However, two bottle blanks of different colors are not combined
19 easily. In general, plastic materials of different colors usually have different
20 heat-absorbing and thermal expansion coefficients, so that when two bottle
21 blanks of different colors are combined, the interface of the two bottle
22 blanks has a weakened bonding strength, so that the interface of the two

1 bottle blanks is easily cracked or broken during the blowing expansion
2 process.

3 SUMMARY OF THE INVENTION

4 The primary objective of the present invention is to provide a
5 multi-color bottle blank and a multi-color container.

6 Another objective of the present invention is to provide a method
7 for making a multi-color bottle blank.

8 A further objective of the present invention is to provide a method
9 for making a multi-color bottle blank, wherein the second bottle blank
10 portion is formed before the first bottle blank portion is fully cooled, so that
11 the first bottle blank portion is integrally combined with the second bottle
12 blank portion exactly and completely to form a multi-color bottle blank
13 having a rigid and stable structure.

14 A further objective of the present invention is to provide a method
15 for making a multi-color container.

16 A further objective of the present invention is to provide a method
17 for making a multi-color container, wherein the blowing expansion device
18 has an elongated shape and is deeply extended into the multi-color bottle
19 blank, so that when the air is blown outward from the blowing expansion
20 device, the expansion force is applied on the inner face of the multi-color
21 bottle blank evenly, so as to expand the multi-color bottle blank outward

1 stably and completely, thereby forming a multi-color container having a
2 rigid and stable structure.

3 Further benefits and advantages of the present invention will
4 become apparent after a careful reading of the detailed description with
5 appropriate reference to the accompanying drawings.

6 **BRIEF DESCRIPTION OF THE DRAWINGS**

7 Fig. 1 is a flow chart of a method for making a multi-color bottle
8 blank in accordance with the preferred embodiment of the present
9 invention;

10 Fig. 2 is a partially cut-away perspective cross-sectional view of a
11 first bottle blank portion in accordance with the preferred embodiment of
12 the present invention;

13 Fig. 3 is a perspective view of the first bottle blank portion as
14 shown in Fig. 2;

15 Fig. 4 is a partially cut-away perspective cross-sectional view of a
16 second bottle blank portion in accordance with the preferred embodiment
17 of the present invention;

18 Fig. 5 is a perspective view of the second bottle blank portion as
19 shown in Fig. 4;

20 Fig. 6 is a flow chart of a method for making a multi-color
21 container in accordance with the preferred embodiment of the present
22 invention;

1 Fig. 7 is a plan cross-sectional view of a multi-color container
2 blank in accordance with the preferred embodiment of the present
3 invention; and

4 Fig. 8 is a perspective view of the multi-color container in
5 accordance with the preferred embodiment of the present invention.

6 **DETAILED DESCRIPTION OF THE INVENTION**

7 Referring to the drawings and initially to Fig. 1, a method for
8 making a multi-color bottle blank in accordance with the preferred
9 embodiment of the present invention comprises a first step 10 of forming a
10 first bottle blank portion, a second step 30 of transferring the mold cavity,
11 and a third step 40 of forming a second bottle blank portion.

12 Referring to Fig. 2, the first step 10 includes injecting a first
13 melted plastic material into a first mold cavity 14 of a first die 12. After the
14 first melted material is cured, the first melted material forms a first bottle
15 blank portion 16. Preferably, the optimum temperature for forming the first
16 bottle blank portion 16 is set at about 200°C to 270°C during the injection
17 molding process.

18 Referring to Fig. 3, the first bottle blank portion 16 is transparent
19 and has a surface formed with a space 18. The space 18 is recessed in the
20 surface of the first bottle blank portion 16 and has a periphery formed with
21 a plurality of protruding portions 22 which are arranged in the space 18. In

1 addition, the space 18 is extended through a peripheral length of the surface
2 of the first bottle blank portion 16.

3 Referring to Figs. 1, 2 and 4, the second step 30 includes
4 transferring the first bottle blank portion 16 that is not fully cooled in the
5 first mold cavity 14 of the first die 12 into a second mold cavity 34 of a
6 second die 32. Preferably, the optimum temperature of the first bottle blank
7 portion 16 is set at about 60°C to 70°C during the transferring process of the
8 second step 30.

9 Referring to Figs. 4 and 5, the third step 40 includes injecting a
10 second melted plastic material into the second mold cavity 34 of the second
11 die 32, so that the second melted material is integrally combined with the
12 first bottle blank portion 16 that is not fully cooled. Preferably, the second
13 melted material is filled with the space 18 of the first bottle blank portion
14 16 and flush with the surface of the first bottle blank portion 16. After the
15 second melted material is cured, the second melted material forms a second
16 bottle blank portion 42.

17 In such a manner, the first bottle blank portion 16 and the second
18 bottle blank portion 42 have different colors. In addition, plastic materials
19 of different colors usually have different heat-absorbing and thermal
20 expansion coefficients. Thus, when the second bottle blank portion 42 is
21 formed before the first bottle blank portion 16 is fully cooled, the first
22 bottle blank portion 16 is combined with the second bottle blank portion 42

1 exactly to form a multi-color bottle blank having a rigid and stable
2 structure. In addition, the combination face of the first bottle blank portion
3 16 and the second bottle blank portion 42 will not be broken after the
4 multi-color bottle blank is cooled.

5 Preferably, the optimum temperature for forming the second
6 bottle blank portion 42 is set at about 200°C to 270°C during the injection
7 molding process. In the second step 30, the first bottle blank portion 16 is
8 transferred from the first mold cavity 14 of the first die 12 to the second
9 mold cavity 34 of the second die 32. In practice, it is designed that the first
10 mold cavity 14 and the second mold cavity 34 are made in the same die
11 which includes two male molds and two female molds. Thus, the distance
12 of movement of the first bottle blank portion 16 is reduced, thereby
13 facilitating control of the temperature of the first bottle blank portion 16,
14 and thereby saving time of movement of the first bottle blank portion 16.

15 Referring to Fig. 6, a method for making a multi-color container
16 in accordance with the preferred embodiment of the present invention
17 comprises a first step 50 of preparing material, a second step 60 of baking,
18 a third step 70 of placing a bottle blank, a fourth step 80 of placing a
19 blowing expansion device, and a fifth step 90 of blow molding.

20 The first step 50 includes preparing a multi-color bottle blank as
21 shown in Fig. 5.

1 The second step 60 includes baking the multi-color bottle blank
2 at a preset temperature to soften the multi-color bottle blank. Each colored
3 material has a different softening formed temperature. Thus, the baking
4 temperature is determined according to the average value of the
5 heat-absorbing values and softened temperature values of the multiple
6 color materials. In the preferred embodiment of the present invention, the
7 baking temperature is optimally set at about 150°C to 170°C. A thermal
8 sensor (not shown) is preferably extended into the multi-color bottle blank
9 to monitor the temperature exactly.

10 The third step 70 includes placing the softened multi-color bottle
11 blank into a die.

12 Referring to Figs. 7 and 8, the fourth step 80 includes placing an
13 elongated blowing expansion device 82 into the softened multi-color bottle
14 blank 84, with a bottom of the blowing expansion device 82 being located
15 adjacent to the bottom of the multi-color bottle blank 84. Preferably, the
16 distance between the bottom of the blowing expansion device 82 and the
17 bottom of the multi-color bottle blank 84 is about one fifth to one fourth of
18 the height of the multi-color bottle blank 84.

19 The fifth step 90 includes blowing air outward from the blowing
20 expansion device 82 and filling the air into the multi-color bottle blank 84,
21 so that the multi-color bottle blank 84 is expanded with the blowing
22 expansion device 82 simultaneously.

1 Preferably, the blowing expansion device 82 has a surface formed
2 with a plurality of air vents 86, and the blowing expansion device 82 is
3 deeply extended into the multi-color bottle blank 84, so that when the air is
4 blown outward from the blowing expansion device 82, the expansion force
5 is applied on the inner face of the multi-color bottle blank 84 evenly, so as
6 to expand the multi-color bottle blank 84 outward stably and completely,
7 thereby forming a multi-color container 88 as shown in Fig. 8.

8 In conclusion, the second bottle blank portion 42 is formed before
9 the first bottle blank portion 16 is fully cooled, so that the first bottle blank
10 portion 16 is integrally combined with the second bottle blank portion 42
11 exactly and completely to form a multi-color bottle blank having a rigid
12 and stable structure. In other words, the temperature control is the primary
13 factor during the forming process.

14 In addition, the blowing expansion device 82 has an elongated
15 shape and is deeply extended into the multi-color bottle blank 84, so that
16 when the air is blown outward from the blowing expansion device 82, the
17 expansion force is applied on the inner face of the multi-color bottle blank
18 84 evenly, so as to expand the multi-color bottle blank 84 outward stably
19 and completely, thereby forming a multi-color container 88 having a rigid
20 and stable structure.

21 Although the invention has been explained in relation to its
22 preferred embodiment(s) as mentioned above, it is to be understood that

1 many other possible modifications and variations can be made without
2 departing from the scope of the present invention. It is, therefore,
3 contemplated that the appended claim or claims will cover such
4 modifications and variations that fall within the true scope of the invention.

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